WIKIPEDIA RESEARCH IN SCHOLARLY PUBLICATIONS IN ASIA AND THE PACIFIC REGION

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Abstract

The visibility of *Wikipedia* research in scholarly publications in the Asia and the Pacific region was studied utilizing the *Scopus* database. Twelve countries (Australia, China, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Singapore, Thailand, Taiwan and Vietnam (in the region were examined: the most productive countries, the most productive authors, the most productive affiliated institutions, the publications most frequently reporting *Wikipedia* research, the most active academic fields, and the preferred publishing venues were identified. The impact of *Wikipedia* research was examined by counting the number of citations received. The most frequently citing authors, the most frequently citing affiliated institutions, countries and academic disciplines were identified. The extent of collaboration in *Wikipedia* research in the region and across the globe was also examined and reported. Scholarly communications regarding *Wikipedia* research in the region appear to be active after 2009 and the collaboration rate is high.

Keywords: *Wikipedia*, scholarly publications, Asia Pacific region

Introduction

Having launched in January 2001 *Wikipedia* reached its 14th anniversary in January 2015**.** This research reports the presence of Wikipedia in the scholarly publications written by authors in the Asian-Pacific countries. The extent of *Wikipedia*'s visibility was examined by analyzing documents included in Elsevier's *Scopus* database. Twelve countries-- Australia, China, India, Indonesia, Japan, South Korea, Malaysia, Singapore, Taiwan, Thailand,and Vietnam --were selected from the countrieswho hosted the *International Conference on Asian Digital Libraries (ICADL)*since its inception in 1999.Those countries are more likely to be active in digital librarianshipin the region. Additionally, New Zealand was added due to its geographical proximity to Australia. *Scopus* includes over 20,800 journal titles (20,000 peer-reviewed) from more than 5,000 international publishers. Also included are 80,000 books and 6.4 million conference papers worldwide. *Scopus*is updated daily and covers health science (32%), physical science (30%), social science (23%) and life science (15%).

Brief introduction to *Wikipedia*

The general public turns daily to *Wikipedia* in 288 languages as itsquick information source. Although thedataabout *Wikipedia*changesevery second, Wikipedia About lists 4,861,081 content articles in English (equivalent to over 2,000 print volumes of the Encyclopedia Britannica) *Wikipedia* is a free,collaboratively-written encyclopedia. Itsarticles are written by identified or anonymous voluntary contributors. Anyone with Internet access can write or edit a*Wikipedia* article although there are guidelines and suggested policies developed by the *Wikipedia* community. *Wikipedia* is run by the nonprofit Wikimedia Foundation.*Wikipedia*'s goal is to be an encyclopedia and reference tool, not a repository of all knowledge. There is a sense of incompleteness as changes or edits in the articleswill be possible.Featured articlesare considered the best, selected by *Wikipedia*'s editors. Afeaturedarticle is listed with abronze star

icon, at the top right of the article's page**.** These account forabout 0.1 percentage of *Wikipedia*

articles and serve as modelsfor writing.*Wikipedia* also differentiates someGood articles (e.g., Cornell Plantations), although not necessarily considered featured articles, with a green plus  at the topright.

Literature Review

Wikipedia has generated a substantial body of research from many disciplines. Using publications contained in ISI's *Web of Science* and Elsevier's *Scopus* database, the academic fields most active in *Wikipedia* research are informationscience, computer science, mathematics, engineering, biochemistry, biology, communication, education, management, etc.(Park, 2011). The first introduction to *Wikipedia* in LIS literature may be *Peter's picks & pans*which stated, " … *Wikipedia* (www.wikipedia.com)I am afraid it is meant to be a communal encyclopedia of the people, by the people, and for the people, which shall not perish from the earth, even if it looks like a prank."Jasco's(2002) prediction appears to be correct in spite of intense controversies about thequality of *Wikipedia*articles since its inception.Concerns about the quality and reliability of *Wikipedia* information were more frequently mentioned in the literature in earlier days and still continue but with more positive comments in recent years. In a study of *Wikipedia* as a reference tool, applying the classic reference evaluation criteria such as purpose, authority, scope, audience, cost and format of resources, it was concluded that Katz's traditional criteria do not work well with *Wikipedia*(Wallace & Van Fleet, 2005). *Nature*'s examination, based on 42 science-related *Wikipedia* articles, found that both *Wikipedia* and *Britannia* contained numerous errors, but the difference in accuracy was not great. The average inaccuracy rate in *Wikipedia* was about four per article, while *Britannia* contained about three(Giles, 2005).Comparing accuracy, breath, depth of historical entries between *Wikipedia* and other encyclopedias revealed that *Wikipedia*'s accuracy was about 80% compared to 95-96% accuracy in other sources (Rector, 2008). Coverage of the 20th century philosophers in *Wikipedia* and in two other widely used online resources was compared for information on their birth date, gender, national and disciplinarybackground. It was found that *Wikipedia* contained more entries for living and "minor" philosophers than traditional resources(Elvebakk, 2008).Examination of citations to *Wikipedia* in scholarly chemistry journals from three major publishers revealed that the number of articles citing *Wikipedia* was small. The author found none of the citations were negative and concluded thatscholarly publications accepted *Wikipedia* as a reliable source (Brazzeal, 2011).

Health information is one of the topics most often sought by the general public in onlineresources. Examining the accuracy and completeness of drug information aboutfive commonly prescribed drugs, astudy reported that *Wikipedia*isgenerally accurate but should not be solely reliedupon.*Wikipedia* articles in the field of health, nutrition and medicine were investigated by Canadian information scientists, who found a high accuracy rate (72%) in the source articles, with minor errors (Temple & Fraser, 2014).Analyzing more than 300 references in nutritional health in *Wikipedia*,Messner and co-authors (2014) found that *Wikipedia's*articles heavily rely on academic publications and reported itsimproved over-allreliability.Among 30,368 citations in *Wikipedia*'s science articles, Nielsen (2007) found that the number of citations to scholarly literature was small compared to the numbers of citations found in scientific literature, although *Wikipedia* showed a slight tendency to cite articles in high-impact ISI journals such as *Nature*,*Science* and the *New England Journal of Medicine* in the sample examined.

In spite of controversies, *Wikipedia*use in all types oflibraries and in classrooms is rising.Academic libraries, faculty's perceptions, student's assignments and projects have reported increased positive responses to *Wikipedia*. For example, libraries at theUniversity of Washington, the University of North Texas, and Wake Forest University, among others, have decided to participate in *Wikipedia* by editing, adding links, or writing new articles(Lally&Dunford, 2007; Pressley & McCallum, 2008).*Wikipedia* has also been used in information literacy instruction (Gray, 2013). One Auburn University librarian shared her experience using *Wikipedia*in student information literacy for developing research topics and search

terms(Calhoun, 2014).Asurvey of a Western US library consortium (22 academic, public, and school libraries) reported the awareness of librarians regarding *Wikipedia* and its usage pattern(Snyder, 2013). Librarians used*Wikipedia* for their personal needs (90%), research (63%) and assisting patrons (53%). Librarians were cautious in advocating *Wikipedia* in the work setting but nevertheless their perceptions were better than inthe previous studies.

Several studies report college students' use of *Wikipedia*.One surveyshowed that they use it as a source for quick fact-checking and for finding background information. Student'sperceptions about information utility and their positive attitude toward *Wikipedia* were related to their usage frequencies(Lim, 2009). A survey aboutCalifornia State University system faculty's perceptions of*Wikipedia* showed that their perceptions of *Wikipedia* have favorablyshifted over a five-year period. More class assignments have been developed using *Wikipedia* (Soules, 2015). *Wikipedia*'s outreach effort to college campuses has been expanded by placing volunteer Campus Ambassadorsto help and support professors in developing class projectsusing *Wikipedia*. Wikipedianin Residencypositions facilitate the *Wikipedia* entries related to that organization. TheOCLC Research Wikipedian in Residencepromoted adding authority control information in *Wikipedia* articles (e.g., theWolfgang Amadeus Mozart article provides links to WorldCat identity, the Virtual International Authority File (VIAF), the Library of Congress Control Number (LCCN), theInternational Standard Name Identifier (ISNI) and other standards). National libraries also embraced*Wikipedia* as an acceptable source of information in establishing name authority records. The current research on*Wikipedia* includes: document classification (Malo, Sinha, Wallenius&Korhonen, 2011), book classification (Yelton, 2011), image indexing(Stvilia, Jorgensen & Wu, 2012) and developing automatic subject indexing of library catalog records(Joorabchi& Mahdi, 2014). In Worldcat,there are more than 350 monographs on *Wikipedia* and more than 140 dissertations, mostly in English, with some German.

Data Collection

Counting scholarly publications about *Wikipedia* contained in*Scopus* is one way of assessing the visibility of *Wikipedia* research in the Asian and Pacific countries. Data was collected in April 2015 based on the following questions:

- How many times *Wikipedia* has been a topic of research in scholarly publications by authors affiliated with institutions in the 12 countries in the Asian and Pacific region?
- Who are the researchers most often engaged in *Wikipedia* research and how often?
- Which articlesin*Wikipedia*researchweremost frequently cited in other scholarly publications?
- What is the extent of the research productivity by affiliated institutions?
- What are the academic fields which are most actively engaged in *Wikipedia* research?
- What is the extent of the citing of*Wikipedia* research by scholars, affiliated institutions and academic fields?
- Which publication venuesaboutWikipedia are most often cited?
- What is the extent of research collaboration about *Wikipedia*among countries within the region and globally?

The coverage of *Wikipedia* in a scholarly publication was assumed if a document includes "Wikipedia" initsabstract.A handout prepared at the Writing Center, theUniversity of North Carolina,Chapel Hilldefines an abstract as "a self-contained, short, and powerful statement that describes a larger work. … An abstract of a social science or scientific work may contain the scope, purpose, results, and contents of the work." A search in*Scopus* using "Wikipedia" in the abstract combined with an affiliated country name was conducted for each of the 12 countries.To obtainthe total number of *Wikipedia* research articles or other itemsby scholars residing in Japan, the search strategy **"**affilcountry (japan*) andabs (Wikipedia*)**"** was executed. The period was limited to 2001 (conception date) to the current date. The result was sorted

by the number of citations in descending order.Additional searcheswereconducted to calculatethe search result from 12 countries by using a Boolean operator "OR." The search (abs (wikipedia*) and affilcountry (Australia*)) OR (abs (wikipedia*) and affilcountry (india*)) gives results for both Australia and India.Internet searches werealso conducted to verify thenames of people and institutions.

Data Analysis and Discussion

Country Productivity

Table 1shows the total number of research itemson *Wikipedia* contained in *Scopus* from the 12 countries. There were a total of 1,260 publications as of April 2015. The number should be taken with caution as *Scopus* updates content daily.

To do a more comprehensive measurement of research productivity, China and Hong Kong were **s**earchedseparately. This was necessarybecause some publications listedHong Kong as the affiliated country without mentioning China**.** The search result was examined and there was 38unique publications from Hong Kong alone. As Hong Kong is part of China, the productivity of China was modified. A search for Vietnam yielded no result. Strangely the form "Viet Nam" as an affiliated country was used in *Scopus.*

The same search,limited to the United States and the same search without limitation to affiliatedcountries wasalso conducted for the comparative purpose of data analysis.The data analysis tools of *Scopus*were utilized.

Table 1 lists the number of publications by country in ranked order. The most productive countries were China, Japan, India, Australia and Singapore. China produces about 34% of the total research output from the region.The top five countries together produced more than 80% of the total research on *Wikipedia*. Interestingly, the total productivity of *Wikipedia*from the region is about equal to the total productivity of the United States. There were a total of 1,205 publications from researchers affiliated with institutions in the U.S.The top five countries in *Wikipedia* research -- U.S., Germany, China, United Kingdom, and Italy -- produced about 57% of the total research. It appears that in the Asian and Pacific region there is much more concentrationin *Wikipedia* research by a few countries.

Table 1

Research production on Wikipedia by country

Country Name	Number of Publications in Scopus
China	424
Japan	225
India	134
Australia	133
Singapore	82
Taiwan	78
New Zealand	59
Korea	58
Thailand	22
Malaysia	22
Vietnam	17
Indonesia	6

Author Productivity

Analysis of author productivity based on the publications included in*Scopus* indicated more than 160 authors in the 12 countries who each published at least three publications. As illustrated in Table 2, four individuals published *Wikipedia* research more than 18 times. The17 mostproductive authors together contributed 239 publications (about 19%).

Individual researchers who published the most contributions are affiliated with universities. A few scholars from Japan are very active in *Wikipedia* research. More than one third of the most active researchers about*Wikipedia* come from academic institutions in Japan although the country's total productivity was second to China's. Kotaro Nakayama from the University of Tokyo published 20 times.ShlomoGeva from Queensland University of Technology, Australia and ShojiroNishioas well asTakahiro Hara**,** both from Osaka University, each published 18 papers respectively.

Table 2

Most productive authors in Wikipedia research in the region

Name	**Country**	**Affiliation**	**Number of publications**
Nakayama, K.	Japan	University of Tokyo	20
Geva, S.	Australia	Queensland University of Technology	18
Hara, T.	Japan	Osaka University	18
Nishio, S.	Japan	Osaka University	18
Sun, A.	Singapore	Nanyang Technological University	15
Trotman, A.	New Zealand	University of Otago	15
Yu, Y.	China	Shanghai Jiadong University	15
Wang, H.	China	Shanghai Jiadong University	14
Yoshikawa, M.	Japan	Kyoto University	14
Nadamoto, A.	Japan	Konan University	13
Varma, V.	India	International Institute of Information Technology Hyderabad	13
Lim, E.-P.	Singapore	Singapore Management University	12
Datta, A.	Singapore	Nanyang Technological University	11
Fukuhara, T.	Japan	National Institute of Advanced Industrial Science and Technology	11
Ulsuro, T.	Japan	University of Tsukuba	11
Witten, I.H.	New Zealand	University of Waikato	11
Milne, D.	New Zealand	University of Waikato	10

Affiliated Institution Productivity

The 17 mosthighly productive institutions are listed in ranked order in Table 3. Mostof the researchers were university-affiliated, except Microsoft Research Asia.These17 institutions contributed 424 publications, more than 35% of the region's total research on *Wikipedia*. Researchers affiliated with Tsinghua University, China and Nanyang Technological University, Singapore were the most productive in *Wikipedia* research. Also, Peking University and Shanghai JiatongUniversity researchers were the most active in China.Researchers affiliated with theUniversity of Tokyo, KyotoUniversity andOsaka University were the most active group in Japan. Professors at Nanyang Technological University and theNational

University of Singapore were the most active in Singapore. Evidently scholars from Queensland University of Technology are themost active in *Wikipedia* research in Australia. Interestingly the most productive 16 U.S. institutions published about 36% of the total publications.

Table 3

Most highly productive institutions on Wikipediaresearch

Institute Name	**Country**	**Number of Publications**
Tsinghua University	China	41
Nanyang Technological University	Singapore	39
University of Tokyo	Japan	33
Peking University	China	32
Kyoto University	Japan	31
Shanghai Jiatong University	China	31
Queensland University of Technology	Australia	30
National University of Singapore	Singapore	23
Microsoft Research Asia	China	21
Osaka University	Japan	20
University of Waikato	New Zealand	20
Wuhan University	China	20
National Taiwan University	Taiwan	19
Japan National Institute of Information	Japan	16
Nagoya University	Japan	16
Research Organization of Information	Japan	16
University of Otago	New Zealand	16

Academic Fields Which Are Most Active in*Wikipedia* Research

Table 4 displays the 10 academic fields which are most active in *Wikipedia r*esearch. The academic fields are categorized by *Scopus*. Titles in *Scopus* are classified into 27 major subject areas and more than 300 minor subject areas. The computer science area is the most active field reporting *Wikipedia* research. About 76% of the publications originate from computer science. The fields of mathematics, engineering and social sciences are also strong in *Wikipedia* research and their combined output reaches about 46% of the total *Wikipedia* research. Although only about5% of research derived from arts and humanities, thissurprisingly exceeds the business, biochemistry and medicine areas. A similar study showed 72%for computer science, and 54% formathematics, social science, and engineering (Park, 2011). The percentages in the table add up more than 100% as *Scopus* classifies some publications in multiple categories.

Table 4

Academic fields most active in Wikipedia research

Academic fields	**Number of publications (frequency counts)**	**Publications (in percent)**
Computer science	937	76
Mathematics	238	19
Engineering	176	14

Academic fields	Number of publications (frequency counts)	Publications (in percent)
Social sciences	154	13
Decision sciences	75	6
Arts and humanities	65	5
Business, management and accounting	58	4
Biochemistry, genetics an molecular biology	42	3
Medicine	23	2
Psychology	15	1

The Leading Publishing Venues Reporting *Wikipedia* Research

Table 5 ranksthe seven most active publications on *Wikipedia* research in *Scopus*.It also appears that *Wikipedia* research has been published more often in the form of proceedings and conference papers than in journal articles according to *Scopus*.However, *Lecture Notes in Computer Science, Lecture Notes in Artificial Intelligence* and *Lecture Notes in Bioinformatics* are singled outas major publishing venues. These seven top ranked publications (including subseries)contained about 22% of the total publications.A similar research article reported that the top 11 publications contained about 20% of the *Wikipedia* research in the *WoS* database (Park, 2011).

Table 5

The Leading publishing venues reporting Wikipedia research

Publication	Number of times
Lecture Notes in Computer Science, including Lecture Noes in Artificial Intelligence and Lecture Notes in Bioinformatics	195
International Conference on Information and Knowledge Management Proceedings	31
Communications in Computer and Information Science	16
Lecture Notes in Electrical Engineering	15
Journal of the American Society for Information Science and Technology	11
NIST Special Publications	8
Information Processing and Management	8

Impact of *Wikipedia*

To examine the impact of *Wikipedia* researchby authors affiliated with institutions in the region, the seven most cited articleswere selected and reviewed in detail. Those were published between 2007and 2010. One publication was in biology and six werecomputer science. Note that data obtained by *Scopus*analysistools must be interpreted with caution and will only provide general trendsand categorization within the*Scopus* database. Table 6 shows the most highly cited *Wikipedia*-related research.

The most cited article was published jointly by D. Milne and I.H.Witten, of the University of Waikato, New Zealand. Their research was cited 260 times and they are also very productive authorsin *Wikipedia*research. The second mosthighly-cited paper was also contributed by authors who were affiliated with universities in New Zealand.Observe that the first author of the third most cited work is affiliated with Vietnam National University, Vietnam.There is a weaker relationshipbetween the author productivity and the frequency of work cited. The authors of frequently cited publications were all affiliated with

universities. For comparison, the most highly cited *Wikipedia*-related publication, *The Pfam protein families database*, written by 16 researchers affiliated with U.K., Sweden and U.S. universitieswas published in *Nucleic Acid Research*, 2012 and cited more than 1,300times.

Table 6

Most highly cited Wikipedia articles

Article title	Author (Authors)	Source Publication	Publication date	Number of times cited
Learning to link with Wikipedia	Milne, D, Witten, I.H.	*International Conference on Information and Knowledge Management, Proceedings*	2008	260
Mining meaning from Wikipedia	Medelyan, O, Milne, D., Legg, C., Witten, I.H.	*International Journal of Human Computer Studies*	2009	138
Learning to classify short and sparse text & web with hidden topic from large-scale data collections	Phan, X.-H., Nguyen, L.M., Honguchi, S.	*Proceeding of the 17th International Conference on World Wide Web 2008*	2008	130
On social web sites	Kim, W., Jeong, O.-R., Lee, S.-W.	*Information Systems*	2010	103
Clustering short texts using Wikipedia	Banerjee, S., Ramanathan, K. Gupta, A.	*Proceedings of the 30th Annual International ACM SIGIR Conference onResearch and Development in Information Retrieval*	2007	96
Collective annotation of Wikipedia entities in web text	Kulkami, S., Singh, A., Ramakrishnan, G., Chakrabati, S.	*Proceedings of the ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*	2009	94
Consensus decision making by fish	Sumpter, D.J.T., Krause, J. James, R., Couzin, I.D., Ward, A.J.W.	*Current Biology*	2008	91

Citations to *Wikipedia*

*Wikipedia's*impact was further analyzed by counting citations by citing authors, affiliated institutions, countries, and academic disciplines. Citations received were counted and combined for the periods 2006-2011 and 2012-2015 to make the results more manageable for data analysis. There were 582 documents cited by 2,885 documents during the period 2006-2011, while there were 590 document cited by 519 documents during the period 2012-2015. Approximately1,200documents were cited by 3,400 documents in the*Scopus* database 2006-2015. Nine scholars who cited *Wikipedia* research most often were from Japan, New Zealand, Netherlands, U.S., and China. Not surprisingly, Kotaro Nakayama, affiliated with the University of Tokyo and Katsumi Tanaka, Kyoto University used *Wikipedia* research most frequently. Japanese scholars are not only the most active as *Wikipedia* researchers but also

cite*Wikipedia* heavily. Table 7 list researchers who cited *Wikipedia* research most often as illustrated by *Scopus.*

Table 7

Citations to *Wikipedia* research from Asia and thePacific regions by specific researchers

Name	Country	Number of documents
Nakayama, K.	Japan	18
Tanaka, K.	Japan	18
Hara, T.	Japan	17
Nishio, S.	Japan	17
Torisawa, K.	Japan	15
Witten, I.H.	New Zealand	13
De Rijke, M.	Netherlands	13
Lay, T.	United States	12
Wang, H.	China	12

Citations to *Wikipedia* Research by Affiliated Institutions

In Table 8, the authors affiliated with Chinese institutions appear to cite *Wikipedia* research most frequently. Researchers affiliated with Tsinghua University are very productive in *Wikipedia* research and in citing*Wikipedia*research.The two most frequent citing affiliated institutions, outside the region are the University of Illinois, Urbana-Champaign and the University of Sheffield, U.K. Although Microsoft Research Asia is highly productive in *Wikipedia* research (9^{th}), itsresearchers appear to cite (4^{th}) more than they produce. Universities in the region not only produce *Wikipedia* research most frequently but also consume it most heavily.

Table 8

Institutions whose researchers cite Wikipedia research most frequently

Institution	Number of documents
Tsinghua University	87
Peking University	62
Kyoto University	56
Microsoft Research Asia	54
University of Illinois at Urbana-Champaign	36
Chinese Academy of Sciences	36
University of Tokyo	35
Shanghai Jiatong University	35
National University of Singapore	33
University of Sheffield	27

Citations to *Wikipedia* Research Produced by Scholars in Asia and the Pacific Region

Table 9 lists the number of citations to *Wikipedia* research by country. Researchers affiliated with institutions in China, the U.S., Japan, Australia and the U.K. cited most frequently in the *Scopus* database. Researchers associated with more than 73 countries cited *Wikipedia* research originatingfrom the Asianand Pacific countries.

Table 9

Citations to Wikipedia by country

Country	Number cited in Scopus
China	803
United States	722
Japan	311
Australia	237
United Kingdom	205
Germany	202
India	167
Canada	122
Italy	107

Citations to *Wikipedia* Research from Asia and thePacific Region by Academic Fields

Table 10 displays academic fields citing *Wikipedia*-related research most often. About 63 percent are from computer science, 16 percent from mathematics, and 15 percent from social sciences. The computer science field yields the highest rank in producing *Wikipedia* research as well as citing its publications. Mathematics is second in both. By contrast, the engineering field produces more research (14 %) than citations (11%). In contrast, medicine is more active in citing (5 percent) than doing research (2 percent), while researchers in arts and humanities are about the same in citing and doing *Wikipedia* research (5 percent). *Wikipedia* research originating from Asia and thePacific region receives manymore citations from the computer science field (63 percent) than any other field compared to *Wikipedi*a research world-wide (42 percent) (Park, 2011). Again *Scopus* may classify publication in multiple categories.

Table 10

Academic fields citing Wikipedia most frequently

Academic fields	Number of publications	Percentage
Computer science	2147	63
Mathematics	532	16
Social sciences	511	15
Engineering	393	11

Wikipedia's Appearance in Scholarly Publications in the Region

Research interest about *Wikipedia* in the region began in 2005 and reached its peak after 2009 according to *Scopus*, although countries like Indonesia and Malaysia began*Wikipedia* research after 2010**.** The years 2009-2014 have produced the most *Wikipedia* research in the region. The first publication on*Wikipedia*originating from the region appeared in the *43rd Annual Meeting of the Association for Computational Linguistics, ACL-5*,held in Ann Arbor, Michigan, June 25-30 2005, with the paper *Organizing English Reading Materials for Vocabulary Learning* by M. Utiyama, M.,Tanimura, and H.Isahara,the National Institute of Information and Communications Technology, Japan. Table 11 displaysthe number of publications about *Wikipedia*and the number of citations received by year.

Wikipedia research has been increasingly visible not only in the number of scholarly publications but also in the number ofcitations year by year. There is significant evidence on the impact of *Wikipedia* in

scholarly communication duringrecent years as reflected in scholar's use in their publications.Although the countries in the region began *Wikipedia* research later, China (the 3rd), Japan (8th), India (11th), and Australia (12th) are ranked among the most productive countries in the world according to *Scopus*. The majority of *Wikipedia* researchwas in the form of conference papers (873, about 70%), and second, in the form of journal articles (353, 28%). These findings are similar to the general trend of *Wikipedia* research in the form of conference papers(about 64%) and articles(26%) for a total of 4,828documents. The Asian and Pacific Wikipedians tend to share their research more often at conferences.

Table 11

Production of Wikipedia research and citations to Wikipedia by year

Year	Number of publications	Number of citations received
2005	3	0
2006	10	1
2007	48	7
2008	91	58
2009	127	149
2010	153	340
2011	162	493
2012	199	604
2013	185	797
2014	173	842

Regional and International Collaboration in *Wikipedia* Research

The strongest regional collaboration was accomplished by researchers affiliated with Japanese institutions in terms of number of countries collaborating. They collaborated with researchers in seven other countries in the region. Next, the most active collaborators wereAustralia and China. Within the region, there arestrong research ties between China and Singapore, and Australia and New Zealand. Outsidethe region, the United States and theUnited Kingdom have most often collaborated with scholars in the region. The United States has been the strongest collaborator within and outside the region, and a speciallystrong research partner with India, China and Australia. It is not surprising to note that the United States isfirst and the United Kingdom is third in*Wikipedia* research.Table 14 displays the frequencies of collaborationbetween countries.

By examining the collaboration of each county with each other country, cross-country analysis was produced.The total number of publications publishedby Japaneseschola rs was 225; nine publications with China, four with France, four with Germany, three with United States, two with Australia, etc. Atotal of 37 publications were written collaboratively between Japan and international scholars. All publications(six) from Indonesia were written collaboratively while Australia (61%), Thailand (60%), and New Zealand (50%) had relatively high international collaboration rates.Surprisingly, Japan producedonly 17% of their publications with scholars in other countries although they are the highest ranked in terms of frequency of collaboration.*Wikipedia* research in Japan appears to be conducted more often with scholars within the country.On the average, *Wikipedia* research in the region displaysabout a 33% collaboration rate.

Table 14

International collaboration in Wikipedia research within Asia and the Pacific countries

Country	**Australia**	**China**	**India**	**Indonesia**	**Japan**	**Korea**	**Malaysia**	**New Zealand**	**Singapore**	**Taiwan**	**Thailand**	**Vietnam**
Australia		5			2		2	10		1		
China	6				9				20	1	2	
India												
Indonesia					1						1	
Japan	2	9		1				1		1	2	2
Korea												
Malaysia	2											
New Zealand	10				1							
Singapore		20										
Taiwan		1			1							
Thailand					2							
Vietnam					2							
U.S.	17	49	15	1	3	6		5	8	7	1	1
U.K	10	10	1			1		3		1	1	
Other	35	25	10	4	16	14	2	13	6	6	6	2

Summary and Conclusions

Twelve countries in Asia and the Pacific region began*Wikipedia r*esearch in 2005, later than their counterpart countries, the U.S., Canada, Germany, the United Kingdom, France, Italy, etc. The most productive five countries in the region --China, Japan, India, Australia and Singapore – rankedamongthe most highly productive 15 countries in the world. The twelve countries together producedmore than 1,260 publications, withChina beingthe most highly productive.

Individual Japanese scholars are ranked first,second (two of themin a three-way tie), and tied for fourth again (two of them)among the most productive scholars. The 17 highly productive scholars who published at least 10 publications wereall affiliated withuniversities and research institutions. Tsinghua University, China, was the most productive institution in *Wikipedia*-related research. Tsinghua also ranked fourth internationally in its research production. Tsinghua University is considered a premieruniversity (C9 League) in China. Among the most productive five institutions, three from **(**China, Tsinghua University, Peking University and Shanghai Jiatong University**)**arealso elite institutions. The second most productive institution was Nanyang Technological University, Singapore.Interestingly, in 2015, theU.S .News &World Report ranked Tsinghua University, Nanyang Technological University, Singapore, Hong Kong University of Science and Technology, the University of Hong Kong, and theNational University of Singapore among the best 15 global universities in computer science.

The most active fields in *Wikipedia* research were computer science and mathematics, which together produced almost 95% of the total research. Among the scholarly publications, *Lecture Notes in Computer Science* and its subseries,*International Conference on Information and Knowledge Management Proceedings* were singled out as major publishing venues.

The impact of *Wikipedia* research was identified by counting citations. The individual researchers, affiliatedinstitutions, countries,and disciplineswhich cited *Wikipedia* research the most frequentlywere examined. Japanese scholars cited *Wikipedia* research most often. Outside the region, two individuals from theNetherlands and the U.S. cited the region's research most often. The affiliated institutions, Tsinghua University, Peking University, Kyoto University and Microsoft Research Asia were outnumbered in citing *Wikipedia* articles.Computer science and mathematics are the strongest fields in citing and especially in producing *Wikipedia* research**.**

The increasing visibility of *Wikipedia* research in scholarly communication is evident from the number of publications produced, theglobally eliteinstitutions producing them, and the number of citations received. *Wikipedia* research fromthe region has been actively cited by scholars in the region but also beyond, notably most often by international scholars from the U.S., and the U.K. Most favored forms of publications by Asian and Pacific Wikipedianswere conference or proceedings papers, rather than journal articles.

Analysis of regional and international collaboration indicated mixed trends. Japan collaborated with the most number of countries in the region, but only 17% of its production was from collaboration. Australia (61%), New Zealand (50%), Singapore (40%) and China (28%) showed a much higher proportion of collaborative work. The average collaboration rate (33%) indicated a strong level of collaboration. Singapore and China are strong collaborators with each other, as are Australia and New Zealand. Outside the region, the U.S. and the U.K. were the most favored collaborators for Asian and Pacific countries.

This study provided a quick overview of*Wikipedia* research and investigated its impact on scholarly communications in Asia and the Pacific region. The findings are descriptive and explanations are based on data from the*Scopus* analysis tools. The search resultsprovided a snapshot of the ever changing *Scopus*database (updated daily). These factors can be considered limitationsof this research.

There are other aspects that need to be further studied, including identifying co-authorship networks, finding diverse topics in *Wikipedia* research, and patterns of scholarly communication by time period. Thesefuture research questionswill add more dimensions to understandingthe visibility of *Wikipedia.*

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